Appendix A
Photo Log

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Photograph 1
TCOU4 DISTAL 4, CP 91 from Access Road, Facing North, 2011-08-04

Photograph 2
TCOU4 DISTAL 4, 349 Caterpillar Track Hoe Loading Chat from CP091, Facing North, 2011-08

Photograph 3
TCOU4 DISTAL 4, 349 Caterpillar Track Hoe Loading Chat from CP091, Facing North, 2011-08-30

Photograph 4
TCOU4 DISTAL 4, 349 Caterpillar Track Hoe Loading from CP091, Facing North, 2011-08-30

Photograph 5
TCOU4 DISTAL 4, Loading Source Material from CB231, Facing East, 2011-08-31

Photograph 6
TCOU4 DISTAL 4, Loading Chat Out at CP091 Grid 30, Facing North, 2012-08-08

Photograph 7
TCOU4 DISTAL 4, Loading Chat Out at CP091 Grid 31 and Grading Bottom of Cap, Facing East, 2012-08-09

Photograph 8
TCOU4 DISTAL 4, Grading Base of Cap at CP091, Facing North, 2012-08-11

Photograph 9
TCOU4 DISTAL 4, CP093-S2 after Work Completed, Facing West, 2012-11-30

Photograph 10
TCOU4 DISTAL 4, CP091 Grid 36, TZ Soil Final Grade, Facing East, 2012-11-15

Photograph 11
TCOU4 DISTAL 4, CP091 Grid 21, Grading TZ Soil Excavated Grid, Facing East, 2012-11-17

Photograph 12
TCOU4 DISTAL 4, CP091 Placement of 18-in Clean Soil on Cap, Facing North, 2012-12-17

Photograph 13
TCOU4 DISTAL 4, CP091 Prior to Clearing During Site Restoration, Facing East, 2015-08-10

Photograph 14
TCOU4 DISTAL 4, CP091 Application of Chicken Litter, Facing Southwest, 2015-09-03

Photograph 15
TCOU4 DISTAL 4, CP091 View of Cap after Application of Amendments, Facing East, 2015-09-26

Photograph 16
TCOU4 DISTAL 4, CP091 Construction of Drainage Swale Rock Check Dams/Coconut Fabric, 2015-10-02

Photograph 17
TCOU4 DISTAL 4, CP091 Hydroseeding Drainage Swale, 2015-10-02

Photograph 18
TCOU4 DISTAL 4, CP091 Hydroseeding Cap, 2015-10-02

Photograph 19
TCOU4 DISTAL 4, CP091 View of Cap after Growth of Annual Cereal Rye from Hydrosseding, Facing Northwest, 2016-03-28

Photograph 20
TCOU4 DISTAL 4, CP091 Mobilization of Rock Crusher (Raptor 800), 2016-03-28

Photograph 21
TCOU4 DISTAL 4, CP091 Closeup of Rock Crusher Teeth, 2016-03-28

Photograph 22
TCOU4 DISTAL 4, CP091 Raptor 800 Rockcrushing, 2016-03-29

Photograph 23
TCOU4 DISTAL 4, CP091 Cap Surface Following Rockcrushing, 2016-04-17

Photograph 24
TCOU4 DISTAL 4, CP091 Closeup Following Rockcrushing, 2016-03-30

Photograph 25
TCOU4 DISTAL 4, CP091 Seeding, 2016-06-09

Photograph 26
TCOU4 DISTAL 4, CP091 Cap after Restoration Complete-During Final Inspection, From Southeast Corner pf CP091 Facing West, 2017-01-19

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Appendix B
Field Reconnaissance Figures

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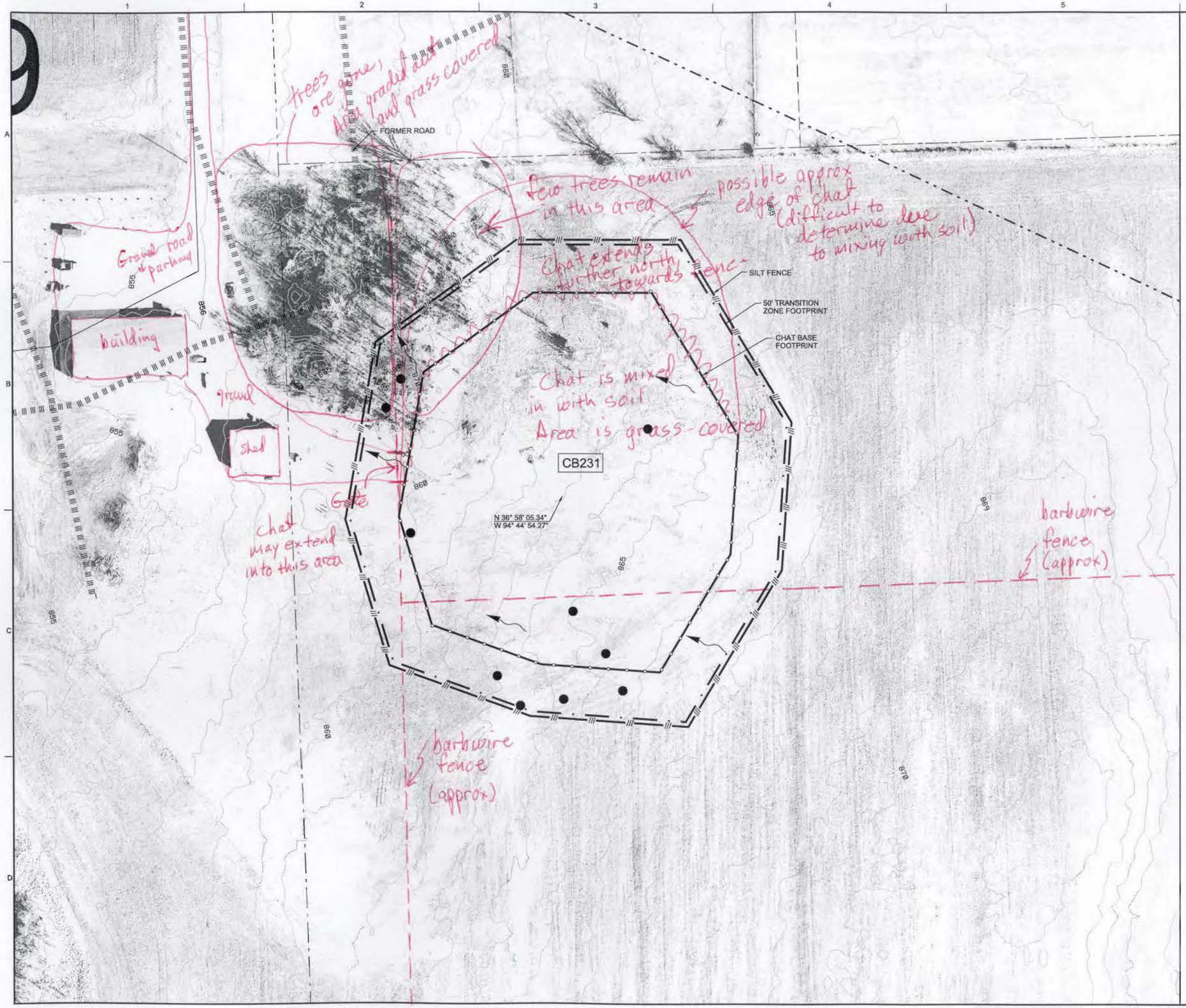


SOUTHEAST DISTAL AREA CHAT BASE CB231

PROPERTY INFORMATION

1. PARCEL ID AND OWNERSHIP:
   0000-30-029-024-0-010-00
   PROPERTY IDENTIFICATION IS CONSIDERED PRELIMINARY. VERIFY WITH PROPERTY OWNERSHIP DATABASE PRIOR TO MOBILIZATION.

2. SECTION/TOWNSHIP/RANGE:
   S30 T29N R24E

3. SOURCE VOLUMES:
   A) TOTAL = 5,466 CY
   B) MARKETABLE = 0 CY
   C) NON-MARKETABLE = 5,466 CY
   MARKETABLE MATERIAL REPRESENTS CHAT THAT IS 2 FEET ABOVE EXISTING GRADE.

N

0 50 100 150
1" = 50'

REGISTERED PROFESSIONAL ENGINEER
MICHAEL DAVID WILSON
18780
OKLAHOMA

THE SEAL APPEARING ON THIS DOCUMENT WAS AUTHORIZED BY MICHAEL DAVID WILSON, PE 18780 ON AUGUST 26, 2009

NO	DATE	DESCRIPTION	DR	CHK	APVD
			APVR	N	APVD
NO	DATE	DESCRIPTION	APVR	N	APVD
NO	DATE	DESCRIPTION	APVR	N	APVD
NO	DATE	DESCRIPTION	APVR	N	APVD
NO	DATE	DESCRIPTION	APVR	N	APVD
NO	DATE	REVISION	APVR	N	BY
DSGN		T MALONE	A SHEPARD		C KOHLER
					M WILSON

12377 MERIT DRIVE, SUITE 100
DALLAS, TEXAS 75251 972-980-2170
Oklahoma Certificate of Authorization # 2012
Expires 30 June 2010

CH2MHILL

EPA
TAR CREEK SOURCE MATERIAL
OPERABLE UNIT 4
OTTAWA COUNTY, OKLAHOMA

CIVIL
SOUTHEAST DISTAL AREA
GRADING PLAN
CHAT BASE CB231

1" = 50'	
VERIFY SCALE	
BAR IS ONE INCH ON ORIGINAL DRAWING. 0 1"	
DATE	AUG 2009
PROJ	388745
DWG	CB231-C-2001SE
SHEET	

ISSUED FOR CONSTRUCTION

NDM SERVER LOCATION: GNV FILENAME: CB231-C-2001SE_388745.dgn PLOT DATE: 8/31/2009 PLOT TIME: 9:59:43 AM

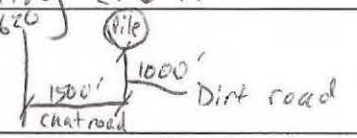
Chat Pile/Chat Base Site Reconnaissance Checklist

Tar Creek Source Material OU4 Remedial Action

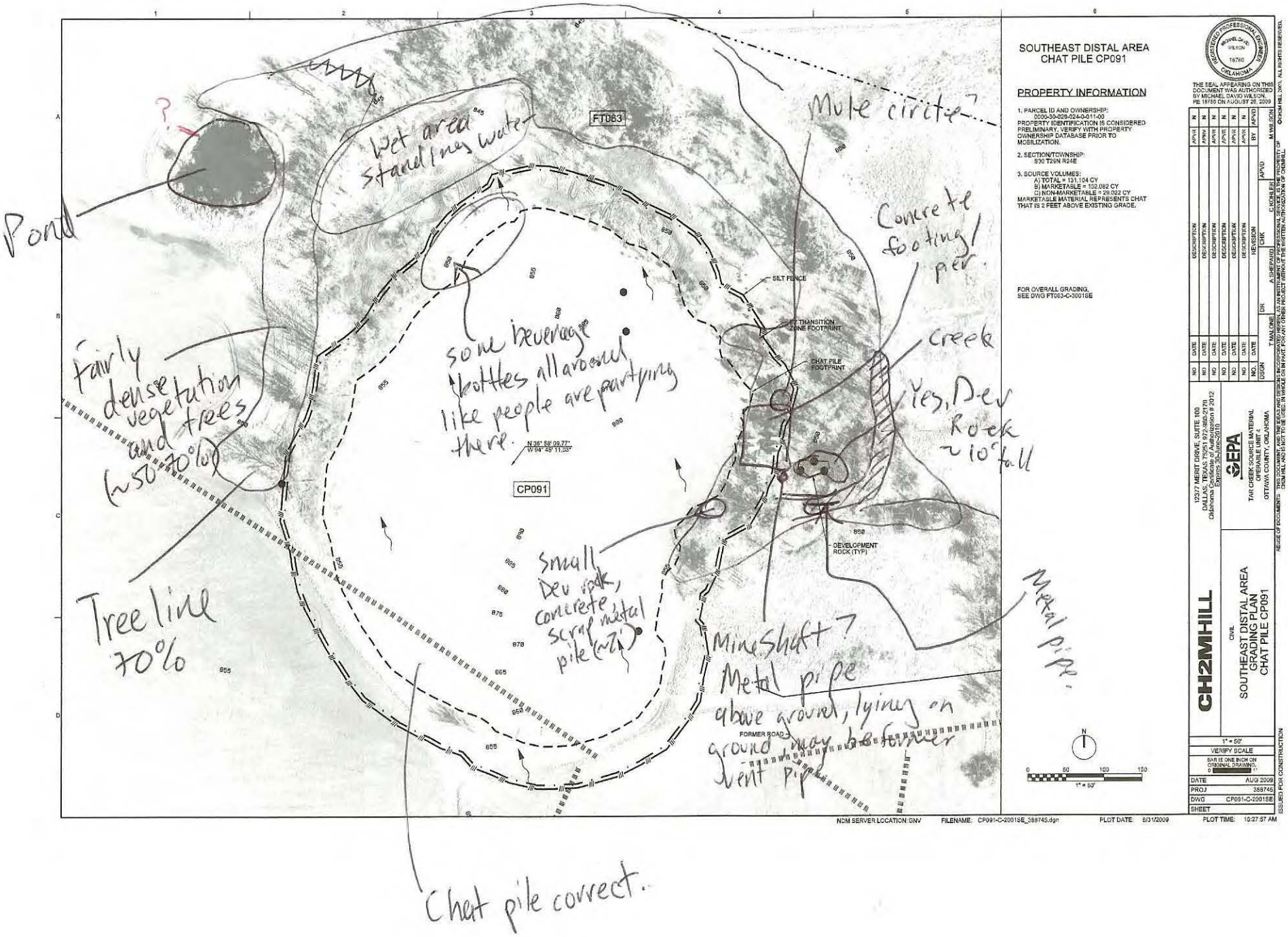
Tar Creek Superfund Site, Ottawa County, Oklahoma

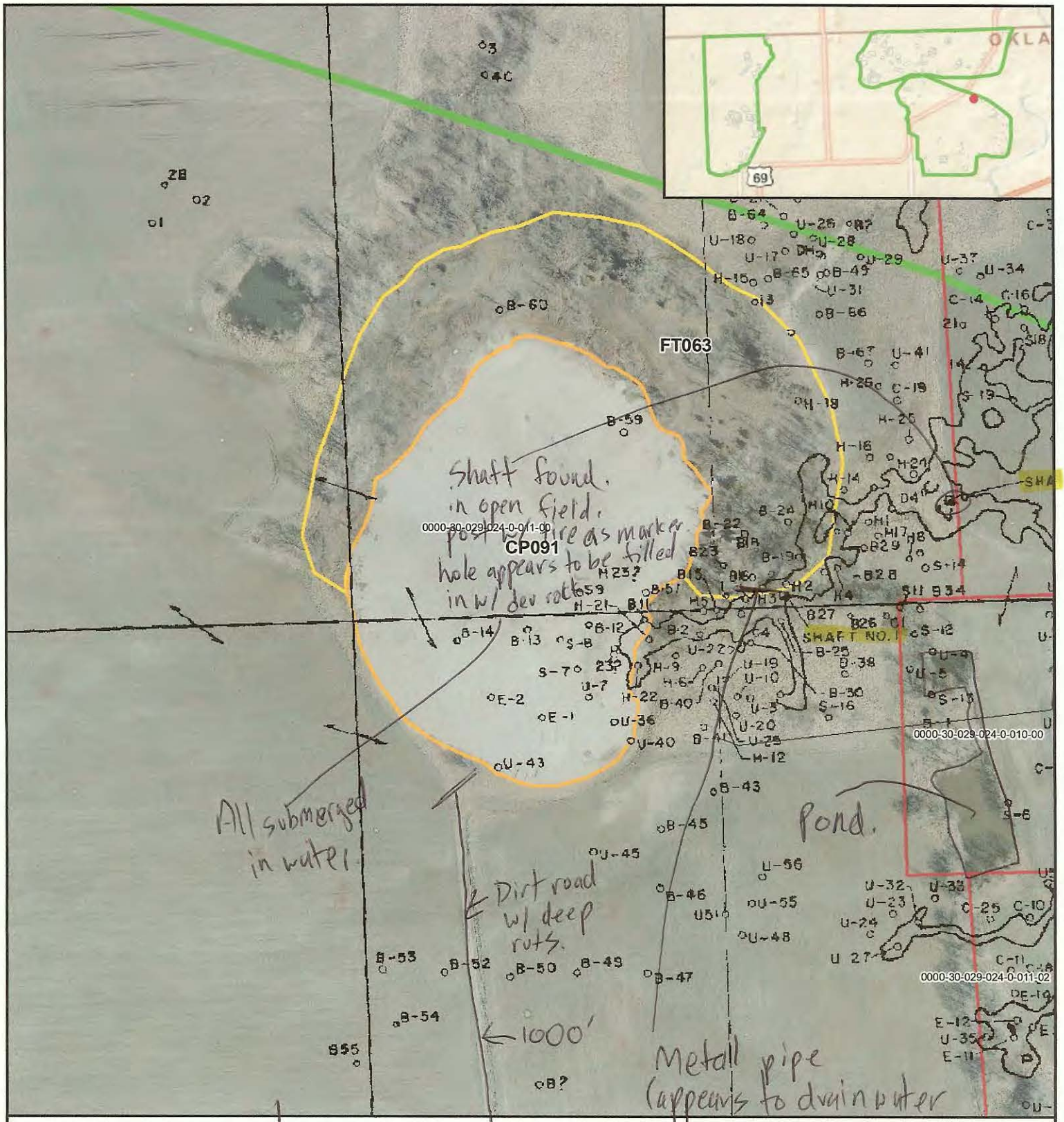
Chat Pile/Base ID No.:	CP091 / FT063	**Access Confirmed:**	Y / N
Property Parcel ID(s):		**Access Type (circle one):**	Consent for Entry
Date of Site Recon:	4/26/10		Settlement Agreement
Owner Name:			
Owner Contact Phone/Email:			
Owner Comment:			
Weather:	60s, Sunny, Windy		
Recon Team Members:	D. Chern / S. Kear		

List chat piles/bases contiguous with this feature:	CP091 - ~40' tall
Average height of chat (feet):	CP091 - 20
Development Rock Piles (number/location/size):	1 pile SE of the footings (~10' tall); 1 small pile SW - contains concrete, scrap metal & dev. rock (~2' tall).
Debris description (volume/ type/location):	Beverage bottles littered around the NW corner of pile.
Vegetation description (amount/ type/location):	None over pile. Mostly grassy area ~~over~~ over fine tailings area. The northern half is all surrounded by dense trees (50-70% coverage) outside the treeline is grass & farmland.
Standing water areas (location/depth):	1 pond NW of pile. 1 pond SE of pile. Low wet areas in fine tailings area. Wet areas and creek on eastern side of pile near footing/pier and dev rock pile.
Concrete foundation piers (number/location):	On east side of pile, large area of piers / foundation footings

Vent pipes or well casings (number/location):	Some rusted metal pipes observed surrounding the footings, but all above ground and lying on ground.
Shafts or subsidence features (number/location):	2 possible shafts. 1) SE corner of footing / west of dev rock pile. 2) 200'-300' E of pile in open field. Post w/ tire as marker. Filled w/ rock and submerged in water.
Fine tailings areas (number/location):	FT063 - Northern half of area surrounding CP091.
Proximity to county roads, and describe potential construction entry routes for the property:	~ 1500' East of 620 Rd. 
Proximity to property road and type (gravel, chat, dirt, etc):	Gravel / haul road running E-W from 620 Rd., then dirt farm road w/ deep ruts running N-S to chat pile.
Proximity to site structures (barns, houses, etc):	No
Proximity to property boundary:	Far away
Proximity to fence line:	Far away
Observe remainder of property on which the chat pile/base is located (and other contiguous properties with same owner [if access is granted]). Describe other chat piles/bases/rock piles (if the other piles/bases are not already identified for work under the RA).	

On printout of draft chat base/pile drawing, mark locations of vent pipes, shafts, extent of chat (if different than indicated on drawing), concrete foundations, wells, chat roads, old railroad grades, fine tailings ponds, development rock piles, additional chat piles, potential obstructions, overhead wires, and other features observed during the site reconnaissance.


SOUTHEAST DISTAL AREA
CHAT PILE CP091
PROPERTY INFORMATION
1. PARCEL ID AND OWNERSHIP:
0000-00-029-024-0-011-00
PROPERTY IDENTIFICATION IS CONSIDERED PRELIMINARY. VERIFY WITH PROPERTY OWNERSHIP DATABASE PRIOR TO MOBILIZATION.
2. SECTION/TOWNSHIP:
S30 T29N R24E
3. SOURCE VOLUMES:
A) TOTAL = 131,104 CY
B) MARKETABLE = 122,082 CY
C) NON-MARKETABLE = 29,022 CY
MARKETABLE MATERIAL REPRESENTS CHAT THAT IS 2 FEET ABOVE EXISTING GRADE.
FOR OVERALL GRADING, SEE DWG FT063-C-30018E
FT063
CP091
SILT FENCE
LF TRANSITION ZONE FOOTPRINT
CHAT PILE FOOTPRINT
DEVELOPMENT ROCK (TYP)
FORMER ROAD
N 36° 58' 09.77"
W 94° 49' 11.33"
CH2MHILL
SOUTHEAST DISTAL AREA
GRADING PLAN
CHAT PILE CP091
EPA
TAR CREEK SUPERFUND SITE
OPERABLE UNIT 1
OTTAWA COUNTY, OKLAHOMA
1" = 50'
VERIFY SCALE
DATE AUG 2009
PROJ 388745
DWG CP091-C-20018E
SHEET
ISSUED FOR CONSTRUCTION
NDM SERVER LOCATION: GNV
FILENAME: CP091-C-20018E_388745.dgn
PLOT DATE: 8/31/2009
PLOT TIME: 10:27:57 AM
Pond
?
Wet area standing water
Mute circle?
Concrete footing/ per.
Creek
Yes, Dev Rock ~10' fall
some beverage bottles all around like people are partying there.
Fairly dense vegetation and trees (~50-70%)
Treeline 70%
Small Dev rock, concrete, scrap metal pile (~2')
Mine Shaft? Metal pipe above ground, lying on ground may be former vent pipe
Metal pipe.
Chat pile correct.



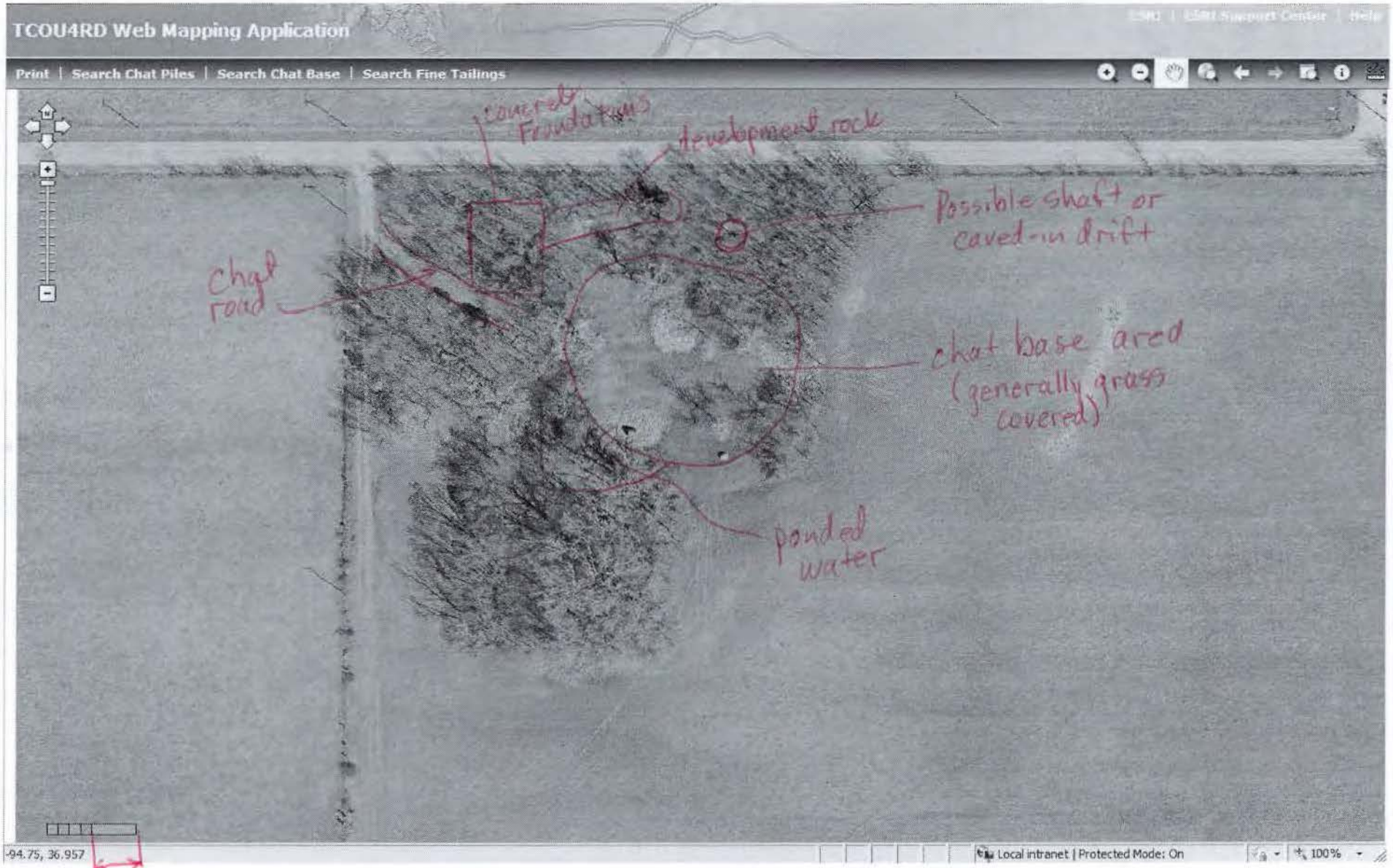
Legend

- Creek
- Chat Bases
- Chat Pile
- Fine Tailing
- Distal Zone
- Property Boundary

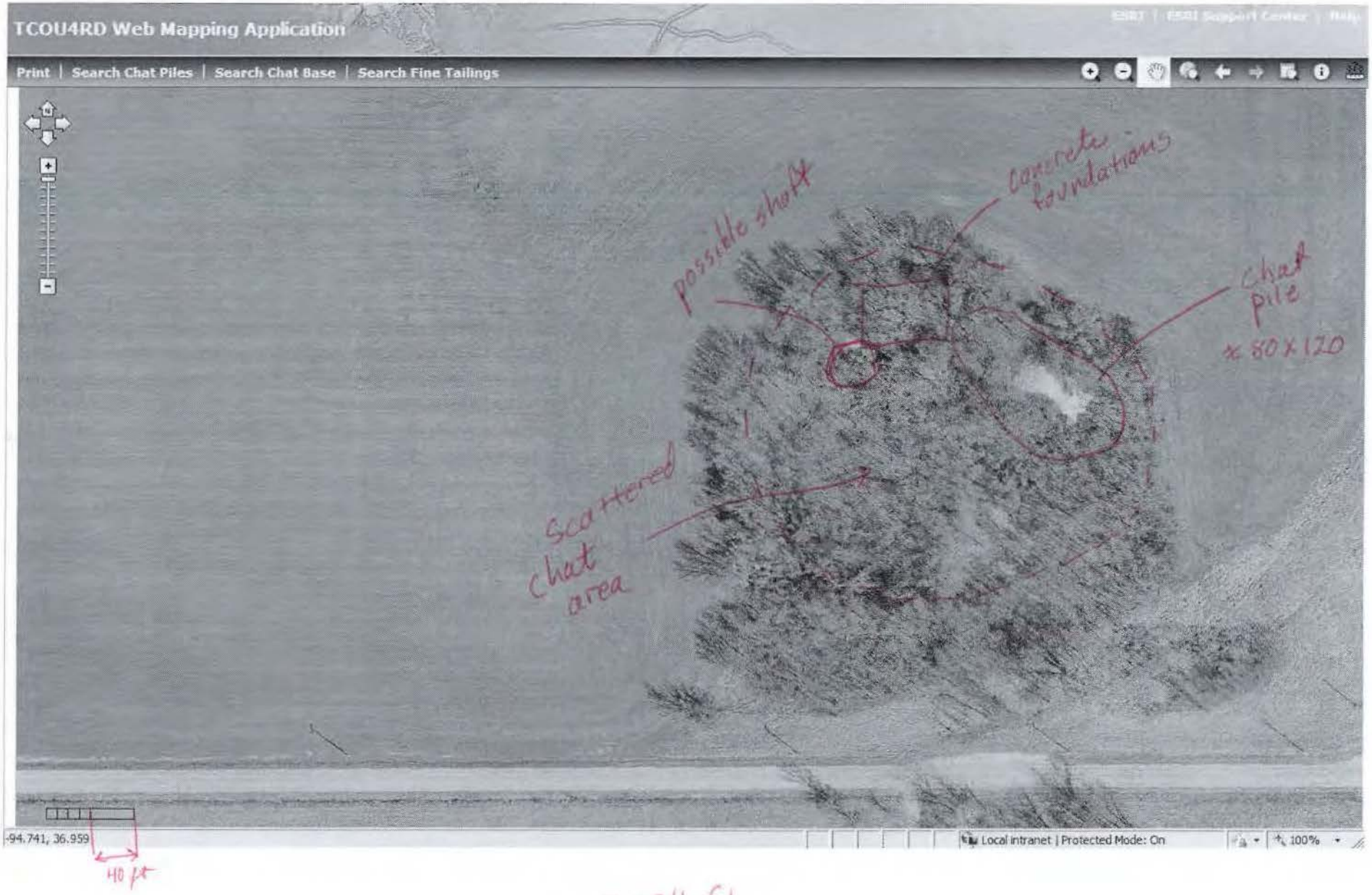
Chat Areas in Distal Zones
CP091
Tar Creek Superfund Site
Operable Unit No. 4
Ottawa County, Oklahoma

CH2MHILL

\\HOLLISTER\PROJ\TAR_CREEK\R6R2-043_TCSM_OU4_FR_395950\MAPFILES\CHAT_AREAS.MXD CRIVERS 3/5/2010 09:41:10


TCOU4RD Web Mapping Application
Print | Search Chat Piles | Search Chat Base | Search Fine Tailings
concrete Foundations
development rock
Possible shaft or caved-in drift
chat road
chat base area (generally grass covered)
ponded water
-94.75, 36.957
40 ft
Local intranet | Protected Mode: On
100%

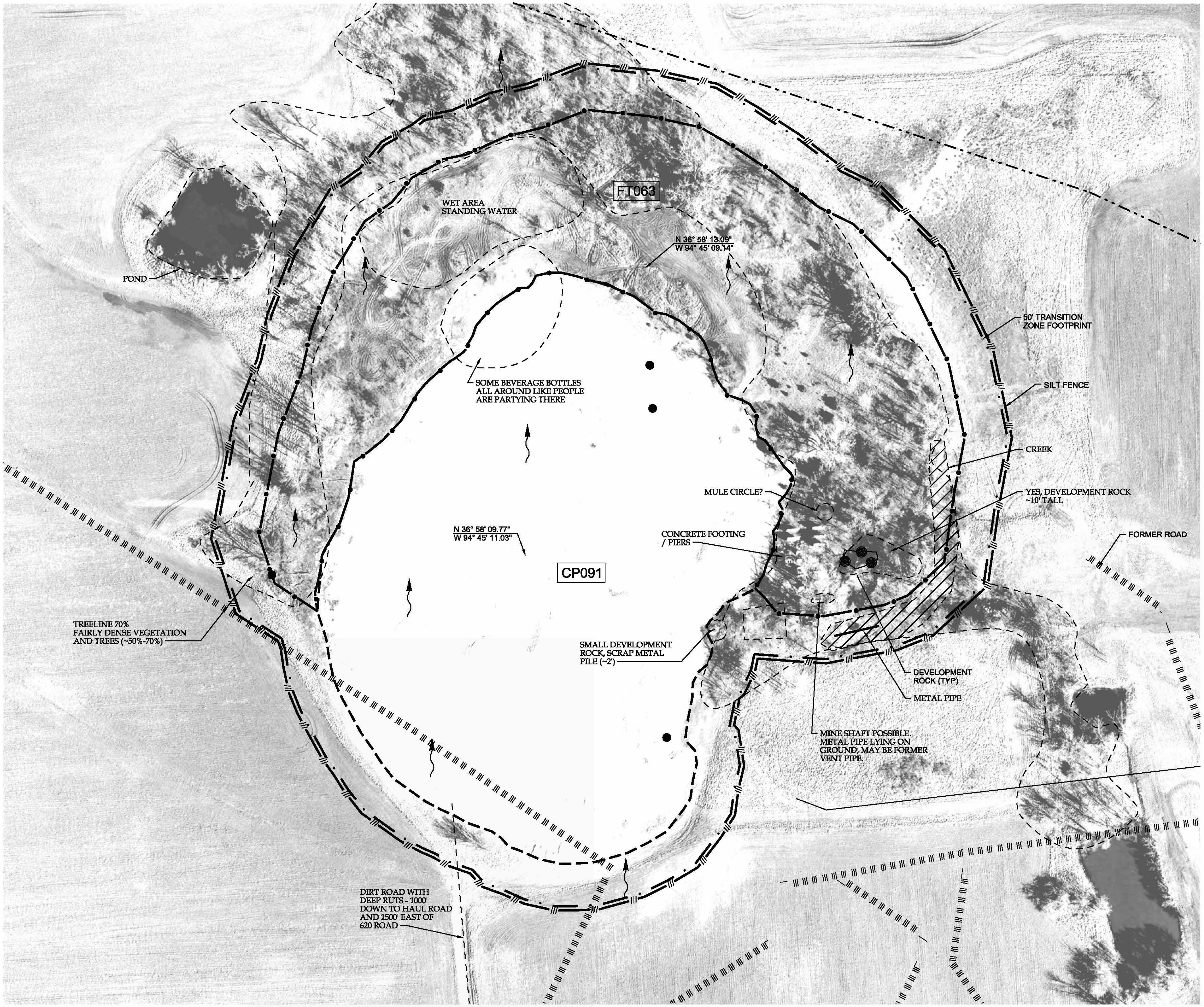
CP094-52


TCOU4RD Web Mapping Application
Print | Search Chat Piles | Search Chat Base | Search Fine Tailings
possible shaft
concrete foundations
chat pile
± 80 x 120
scattered chat area
-94.741, 36.959
Local intranet | Protected Mode: On
100%
40 ft

CP094-51

1 2 3 4 5 6

A B C D



RECONNAISSANCE NOTES

THERE IS ONE DEVELOPMENT ROCK PILE SE OF THE FOOTINGS THAT IS ABOUT 10' TALL AND ONE SMALL PILE TO THE SW THAT CONTAINS CONCRETE, SCRAP METAL AND DEVELOPMENT ROCK. BEVERAGE BOTTLES ARE LITTERED AROUND THE NW CORNER OF THE PILE. THERE IS NO VEGETATION OVER THE PILE. MOSTLY GRASSY AREA OVER FINE TAILINGS AREA. THE NORTHERN HALF IS ALL SURROUNDED BY DENSE TREES (50-70%) COVERAGE. OUTSIDE THE TREELINE IS GRASS AND FARMLAND. THERE IS ONE POND NW OF THE PILE AND ONE POND SE OF PILE. LOW WET AREAS AND CREEK ON EASTERN SIDE OF PILE NEAR FOOTING/PIER AND DEVELOPMENT ROCK PILE. THERE ARE CONCRETE FOUNDATION PIERS ON EAST SIDE OF PILE, LARGE AREA OF PIERS / FOUNDATION FOOTINGS. VENT PIPES - THERE WERE SOME RUSTED METAL PIPES OBSERVED SURROUNDING THE FOOTINGS, BUT ALL ABOVE GROUND AND LYING ON THE GROUND. SHAFTS AND SUBSIDENCE FEATURES - THERE WERE TWO POSSIBLE SHAFTS. ONE IN THE SE CORNER OF THE FOOTING WEST OF THE DEVELOPMENT ROCK WITH A METAL PIPE THAT APPEARS TO DRAIN WATER FROM THE PILE INTO THE CREEK. THE OTHER IS 200'-300' E OF THE PILE IN AN OPEN FIELD, FILLED WITH ROCK AND SUBMERGED IN WATER. POST A TIRE AS A MARKER. FT063 IS THE NORTHERN HALF OF AREA SURROUNDING CP091. THERE IA A GRAVEL / HAUL ROAD RUNNING E-W FROM 620 ROAD, THEN DIRT FARM ROAD WITH DEEP RUTS RUNNING N-S TO CHAT PILE. THERE IS NO PROXIMITY TO SITE STRUCTURES. THE PROPERTY BOUNDARY IS FAR AWAY AS IS THE FENCE LINE.

– – – – – – FIELD RECONNAISSANCE AREAS OF INTEREST

N

0 60 120 180
1" = 60'

NO	DATE	DESCRIPTION	APVR	N
NO	DATE	DESCRIPTION	APRV	N
NO	DATE	DESCRIPTION	APVR	N
NO	DATE	DESCRIPTION	APVR	N
NO	DATE	DESCRIPTION	APVR	N
NO	DATE	DESCRIPTION	APVR	N
NO.	DATE	REVISION	BY	APVD

DSGN	DR	CHK	APVD
T MALONE	A SHEPARD	C KOHLER	M WILSON

12377 MERIT DRIVE, SUITE 100
DALLAS, TEXAS 75251 972-980-2170
Oklahoma Certificate of Authorization # 2012
Expires 30-June-2010

EPA

TAR CREEK SOURCE MATERIAL
OPERABLE UNIT 4
OTTAWA COUNTY, OKLAHOMA

CH2MHILL

CIVIL

SOUTHEAST DISTAL AREA
OVERALL GRADING PLAN
INCLUDING FT063 & CP091

1" = 60'

VERIFY SCALE

BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"

DATE	NOV 2010
PROJ	388745
DWG	FT063-C-3001SE
SHEET	

ISSUED FOR CONSTRUCTION

NDM SERVER LOCATION: GNV FILENAME: FT063-C-3001SE_388745.dgn PLOT DATE: 11/2/2010 PLOT TIME: 4:01:54 PM

Appendix C
Chat Reuse Packages

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REMEDIAL ACTION CONTRACT

United States Environmental Protection Agency Region 6

Chat Characterization Data

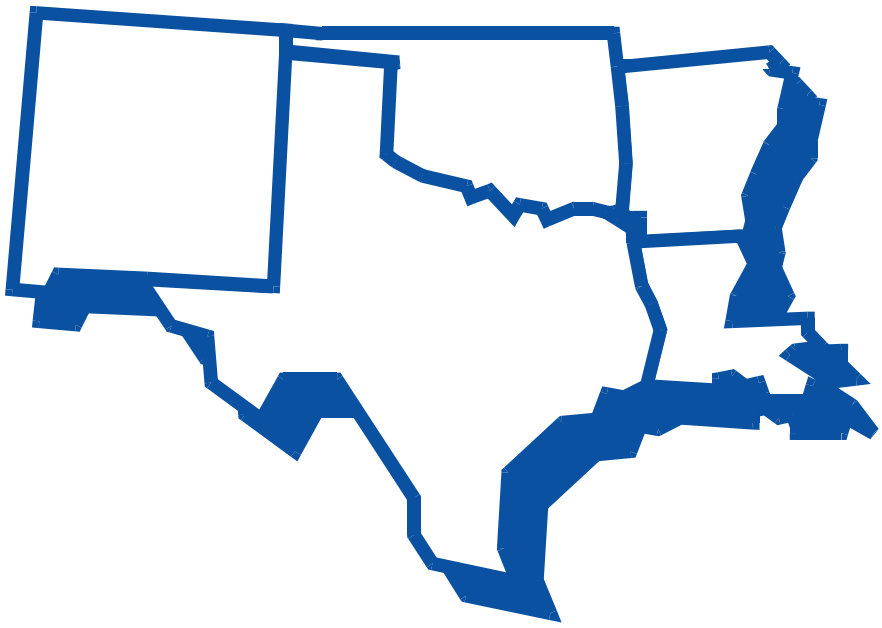
Chat Base 231

Source Material Operable Unit 4
ARRA Remedial Action

Tar Creek Superfund Site
Ottawa County, Oklahoma

Task Order No. 0043-RARA-06JW

May 2010



CH2MHILL

Chat Characterization Results
Tar Creek OU4 Source Material Remedial Action

Chat Location Information

Chat Pile/Base ID	Property Identifier(s)
CB231	24010302900
	24011302902
Land Restricted	**Multiple owners of Pile/Base?**
No	No

Chat Characterization Summary

Estimated Chat Volume of Pile/Base

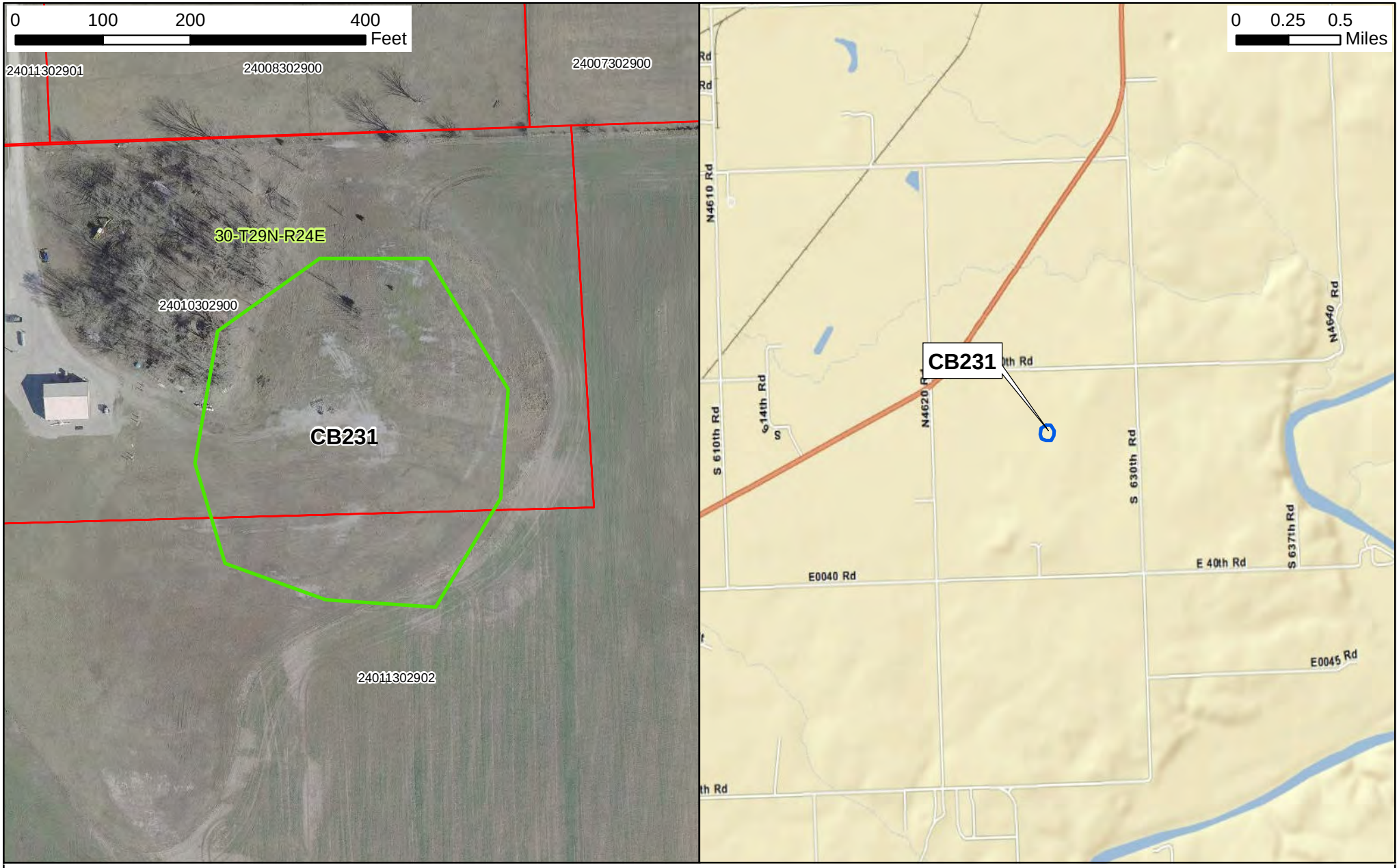
5,169 cubic yards

Sieve Analysis Results

Sample ID	Date Sampled	Sieve Size (inches)	Amount: % Retained
CB231-01	3/2/2010	1/2	14.6%
		3/8	17.1%
		1/4	24.9%
		No. 4	34.1%
		No. 8	54.8%
		No. 16	67.3%
		No. 30	75.3%
		No. 50	80.7%
		No. 100	83.9%
		No. 200	86.3%
Sample ID	**Date Sampled**	**Sieve Size (inches)**	**Amount: % Retained**
CB231-02	3/2/2010	1/2	0.0%
		3/8	0.0%
		1/4	3.5%
		No. 4	21.2%
		No. 8	59.3%
		No. 16	74.3%
		No. 30	83.4%
		No. 50	89.0%
		No. 100	91.6%
		No. 200	93.1%

Specific Gravity Results			
Sample ID	**Date Sampled**	**Specific Gravity**	
CB231-01	3/2/2010	Fine Aggregate (apparent): 2.71	
		Coarse Aggregate (apparent): 2.62	
		Fine Aggregate (bulk): 2.53	
		Coarse Aggregate (bulk): 2.48	
Sample ID	**Date Sampled**	**Specific Gravity**	
CB231-02	3/2/2010	Fine Aggregate (apparent): 2.71	
		Coarse Aggregate (apparent): 2.66	
		Fine Aggregate (bulk): 2.52	
		Coarse Aggregate (bulk): 2.56	
Lead Analysis Results			
Sample ID	**Date Sampled**	**Results**	**Units**
CB231-01	3/2/2010	73.8	mg/kg
CB231-02	3/2/2010	47.6	mg/kg

Chat Pile/Base Location Map



Legend

- Creek
- Chat Piles
- Fine Tailings
- Chat Bases
- Property Boundary
- Sections
- Limited Access
- Highway
- Major Road
- Local Road

N

CB231
Pile/Base Location Map

Tar Creek Superfund Site
Operable Unit No. 4
Ottawa County, Oklahoma

CH2MHILL

J:\Tar_Creek\R6R2-043_TCSM_OU4_FR_395950\MapFiles\Materials_Processing_Mapbook_Bases.mxd zhirsch 7/25/2011 3:10:41 PM

Sieve Analysis Data

ANDERSON ENGINEERING, INC.

AGGREGATE- SIZE & SG REPORT

ASTM C136 & C127, C128

ENGINEERS - SURVEYORS - LABORATORIES - GEOTECHNICAL

811 E. THIRD ST, JOPLIN, MO 64801 417-782-7399

2045 W. WOODLAND, SPRINGFIELD, MO 65807 417-866-2741

JOB NAME :	*Tar Creek Super Fund Cleanup - 395950*			**CLIENT:**	CH2M HILL
JOB NO. :	*50013-10*	AE LAB NO.:	JS-005	**DATE :**	3/19/10
BORING / PIT NO. :	-	**DEPTH / ELEV. :**	-	**SAMPLE NO. :**	*CB231-01*
SAMPLE LOCATION :	-			**REVIEWED BY :**	CRW
SOIL DESCRIPTION :	*CHAT GRAVEL SAMPLE*			**SAMPLE TYPE :**	*Composite*
SG Fine Agg, G bulk :	*2.53*	**SG Fine Agg, G app.:**	*2.71*	**Fine Agg. Abs, %:**	2.7%
SG Coarse, G bulk :	*2.48*	**SG Coarse, G app.:**	*2.62*	**Coarse Abs, %:**	2.1%
FINES , % :	*13.7%*				
CLASSIFICATION	-	**UNIFIED :**	*SM*	**AASHTO :**	-

Sieve No.	Percent Retained	Cumulative Percent Retained	Percent Finer
0.5"	14.6%	14.6%	85.4%
0.375"	2.4%	17.1%	82.9%
0.25"	7.9%	24.9%	75.1%
4	9.2%	34.1%	65.9%
8	20.7%	54.8%	45.2%
16	12.4%	67.3%	32.7%
30	8.0%	75.3%	24.7%
50	5.5%	80.7%	19.3%
100	3.2%	83.9%	16.1%
200	2.3%	86.3%	13.7%

ANDERSON ENGINEERING, INC.

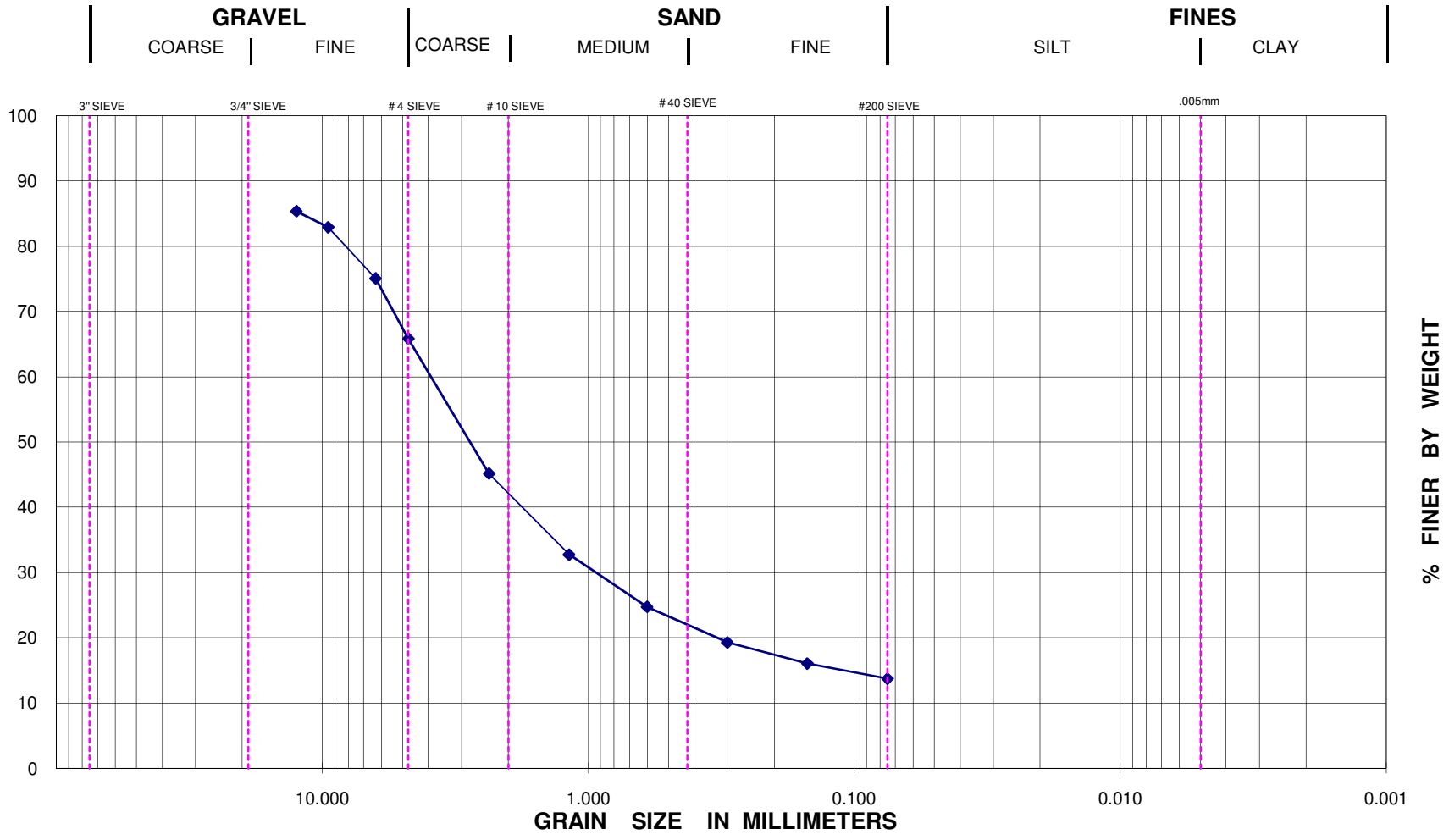
ENGINEERS - SURVEYORS - LABORATORIES - GEOTECHNICAL

811 E. THIRD ST, JOPLIN, MO 64801 417-782-7399, & 2045 W. WOODLAND, SPRINGFIELD, MO 65807 417-866-2741

AGGREGATE- SIZE & SG REPORT

ASTM C136 & C127, C128

JOB NAME :	*Tar Creek Super Fund Cleanup - 395950*			**CLIENT:**	CH2M HILL	AE LAB NO.:	JS-005
JOB NO. :	*50013-10*	**REPORT NO. :**	-	**DATE :**	3/19/10	**REVIEWED BY :**	CRW
BORING / PIT NO. :	-	**DEPTH / ELEV. :**	-	**SAMPLE NO. :**	*CB231-01*	**SAMPLE TYPE :**	*Composite*
SAMPLE LOCATION : -							
SOIL DESCRIPTION : *CHAT GRAVEL SAMPLE*						**SP. GRAVITY, Gs :**	-
SG Fine Agg, G bulk :	*2.53*	**SG Fine Agg, G app.:**	*2.71*	**Fine Agg. Abs, %:**	2.7%	**FINES , % :**	*13.7%*
SG Coarse, G bulk :	*2.48*	**SG Coarse, G app.:**	*2.62*	**Coarse Abs, %:**	2.1%	**COEFF. OF CURVATURE , C_C :**	-
CLASSIFICATION	-	**UNIFIED :**	*SM*	**AASHTO :**	-	**COEFF. OF UNIFORMITY , C_U :**	-



ANDERSON ENGINEERING, INC.

AGGREGATE- SIZE & SG REPORT

ASTM C136 & C127, C128

ENGINEERS - SURVEYORS - LABORATORIES - GEOTECHNICAL

811 E. THIRD ST, JOPLIN, MO 64801 417-782-7399

2045 W. WOODLAND, SPRINGFIELD, MO 65807 417-866-2741

JOB NAME :	*Tar Creek Super Fund Cleanup - 395950*			**CLIENT:**	CH2M HILL
JOB NO. :	*50013-10*	AE LAB NO.:	JS-006	**DATE :**	3/19/10
BORING / PIT NO. :	-	**DEPTH / ELEV. :**	-	**SAMPLE NO. :**	*CB231-02*
SAMPLE LOCATION :	-			**REVIEWED BY :**	CRW
SOIL DESCRIPTION :	*CHAT GRAVEL SAMPLE*			**SAMPLE TYPE :**	*Composite*
SG Fine Agg, G bulk :	*2.52*	**SG Fine Agg, G app.:**	*2.71*	**Fine Agg. Abs, %:**	2.7%
SG Coarse, G bulk :	*2.56*	**SG Coarse, G app.:**	*2.66*	**Coarse Abs, %:**	1.4%
FINES , % :	*6.9%*				
CLASSIFICATION	-	**UNIFIED :**	*SP-SM*	**AASHTO :**	-

Sieve No.	Percent Retained	Cumulative Percent Retained	Percent Finer
0.5"	0.0%	0.0%	100.0%
0.375"	0.0%	0.0%	100.0%
0.25"	3.5%	3.5%	96.5%
4	17.7%	21.2%	78.8%
8	38.0%	59.3%	40.7%
16	15.0%	74.3%	25.7%
30	9.1%	83.4%	16.6%
50	5.6%	89.0%	11.0%
100	2.6%	91.6%	8.4%
200	1.5%	93.1%	6.9%

ANDERSON ENGINEERING, INC.

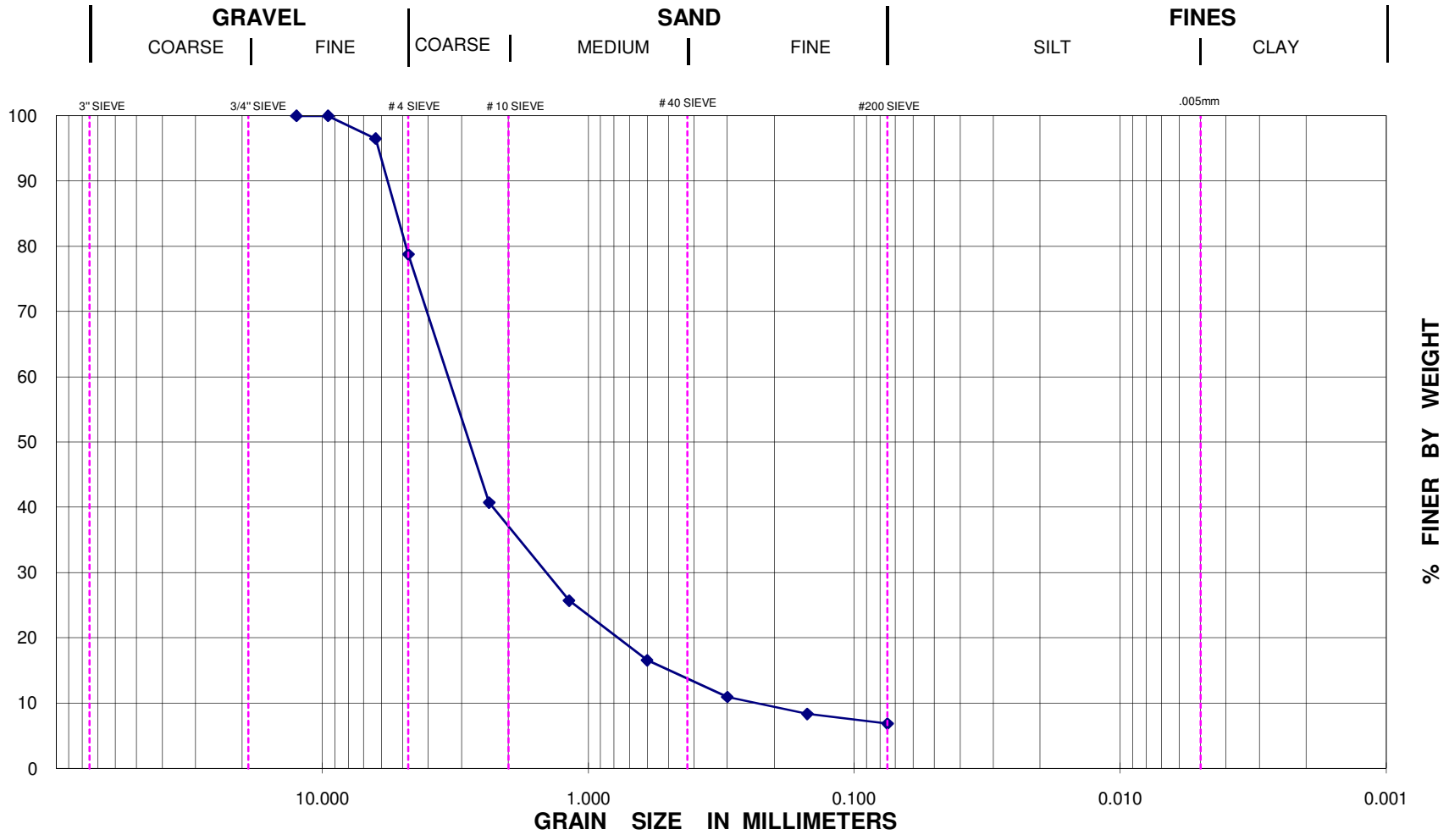
ENGINEERS - SURVEYORS - LABORATORIES - GEOTECHNICAL

811 E. THIRD ST, JOPLIN, MO 64801 417-782-7399, & 2045 W. WOODLAND, SPRINGFIELD, MO 65807 417-866-2741

AGGREGATE- SIZE & SG REPORT

ASTM C136 & C127, C128

JOB NAME :	*Tar Creek Super Fund Cleanup - 395950*			**CLIENT:** CH2M HILL		AE LAB NO.:	JS-006
JOB NO. :	*50013-10*	**REPORT NO. :**	-	**DATE :**	3/19/10	**REVIEWED BY :**	CRW
BORING / PIT NO. :	-	**DEPTH / ELEV. :**	-	**SAMPLE NO. :**	*CB231-02*	**SAMPLE TYPE :**	*Composite*
SAMPLE LOCATION : -							
SOIL DESCRIPTION : *CHAT GRAVEL SAMPLE*						**SP. GRAVITY, Gs :**	-
SG Fine Agg, G bulk :	*2.52*	**SG Fine Agg, G app.:**	*2.71*	**Fine Agg. Abs, %:**	2.7%	**FINES , % :**	*6.9%*
SG Coarse, G bulk :	*2.56*	**SG Coarse, G app.:**	*2.66*	**Coarse Abs, %:**	1.4%	**COEFF. OF CURVATURE , C_C :**	-
CLASSIFICATION	-	**UNIFIED :**	*SP-SM*	**AASHTO :**	-	**COEFF. OF UNIFORMITY , C_U :**	-



Lead Analysis Data

METHOD 3050B/6010B
LEAD BY TRACE ICP

Client : CH2M HILL	Date Collected: 03/02/10 10:20
Project : TAR CREEK OU4	Date Received: 03/06/10
SDG NO. : 10C101	Date Extracted: 03/09/10 09:30
Sample ID: CB231-01	Date Analyzed: 03/10/10 01:49
Lab Samp ID: C101-06	Dilution Factor: 1
Lab File ID: ID8C010114	Matrix : SOIL
Ext Btch ID: IPC017S	% Moisture : 11.3
Calib. Ref.: ID8C010109	Instrument ID : EMAXTID8

PARAMETERS	RESULTS (mg/kg)	RL (mg/kg)	MDL (mg/kg)
Lead	73.8	1.13	0.225

METHOD 3050B/6010B
LEAD BY TRACE ICP

Client : CH2M HILL	Date Collected: 03/02/10 09:35
Project : TAR CREEK OU4	Date Received: 03/06/10
SDG NO. : 10C101	Date Extracted: 03/09/10 09:30
Sample ID: CB231-02	Date Analyzed: 03/10/10 01:43
Lab Samp ID: C101-05	Dilution Factor: 1
Lab File ID: ID8C010113	Matrix : SOIL
Ext Btch ID: IPC017S	% Moisture : 6.0
Calib. Ref.: ID8C010109	Instrument ID : EMAXTID8

PARAMETERS	RESULTS (mg/kg)	RL (mg/kg)	MDL (mg/kg)
Lead	47.6	1.06	0.213

REMEDIAL ACTION CONTRACT

United States Environmental Protection Agency Region 6

Chat Characterization Data

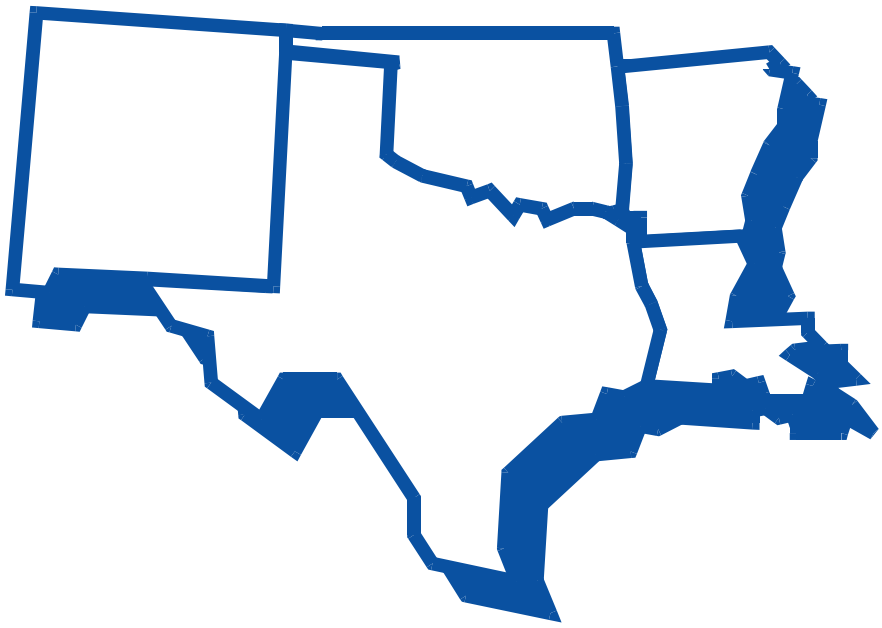
Chat Pile 091

Source Material Operable Unit 4
ARRA Remedial Action

Tar Creek Superfund Site
Ottawa County, Oklahoma

Task Order No. 0043-RARA-06JW

April 2010



CH2MHILL

Chat Characterization Results
Tar Creek OU4 Source Material Remedial Action

Chat Location Information

Chat Pile/Base ID	Property Identifier(s)
CP091	24011302900
Land Restricted	**Multiple owners of Pile/Base?**
No	No

Chat Characterization Summary

Estimated Chat Volume of Pile/Base

114,822 cubic yards

Sieve Analysis Results

Sample ID	Date Sampled	Sieve Size (inches)	Amount: % Retained
CP091-01	3/5/2010	1/2	0.0%
		3/8	0.0%
		1/4	10.5%
		No. 4	18.7%
		No. 8	39.9%
		No. 16	57.1%
		No. 30	71.5%
		No. 50	82.8%
		No. 100	89.3%
		No. 200	93.0%
Sample ID	**Date Sampled**	**Sieve Size (inches)**	**Amount: % Retained**
CP091-02	3/5/2010	1/2	0.0%
		3/8	0.3%
		1/4	13.7%
		No. 4	28.1%
		No. 8	50.9%
		No. 16	65.0%
		No. 30	75.2%
		No. 50	83.1%
		No. 100	88.1%
		No. 200	91.5%

Sample ID	Date Sampled	Sieve Size (inches)	Amount: % Retained
CP091-03	3/5/2010	1/2	0.0%
		3/8	1.4%
		1/4	12.9%
		No. 4	25.6%
		No. 8	49.2%
		No. 16	62.8%
		No. 30	73.1%
		No. 50	81.1%
		No. 100	86.6%
		No. 200	90.0%
Sample ID	**Date Sampled**	**Sieve Size (inches)**	**Amount: % Retained**
CP091-04	3/5/2010	1/2	0.0%
		3/8	0.0%
		1/4	14.0%
		No. 4	25.5%
		No. 8	51.6%
		No. 16	67.2%
		No. 30	77.6%
		No. 50	85.1%
		No. 100	89.4%
		No. 200	92.3%

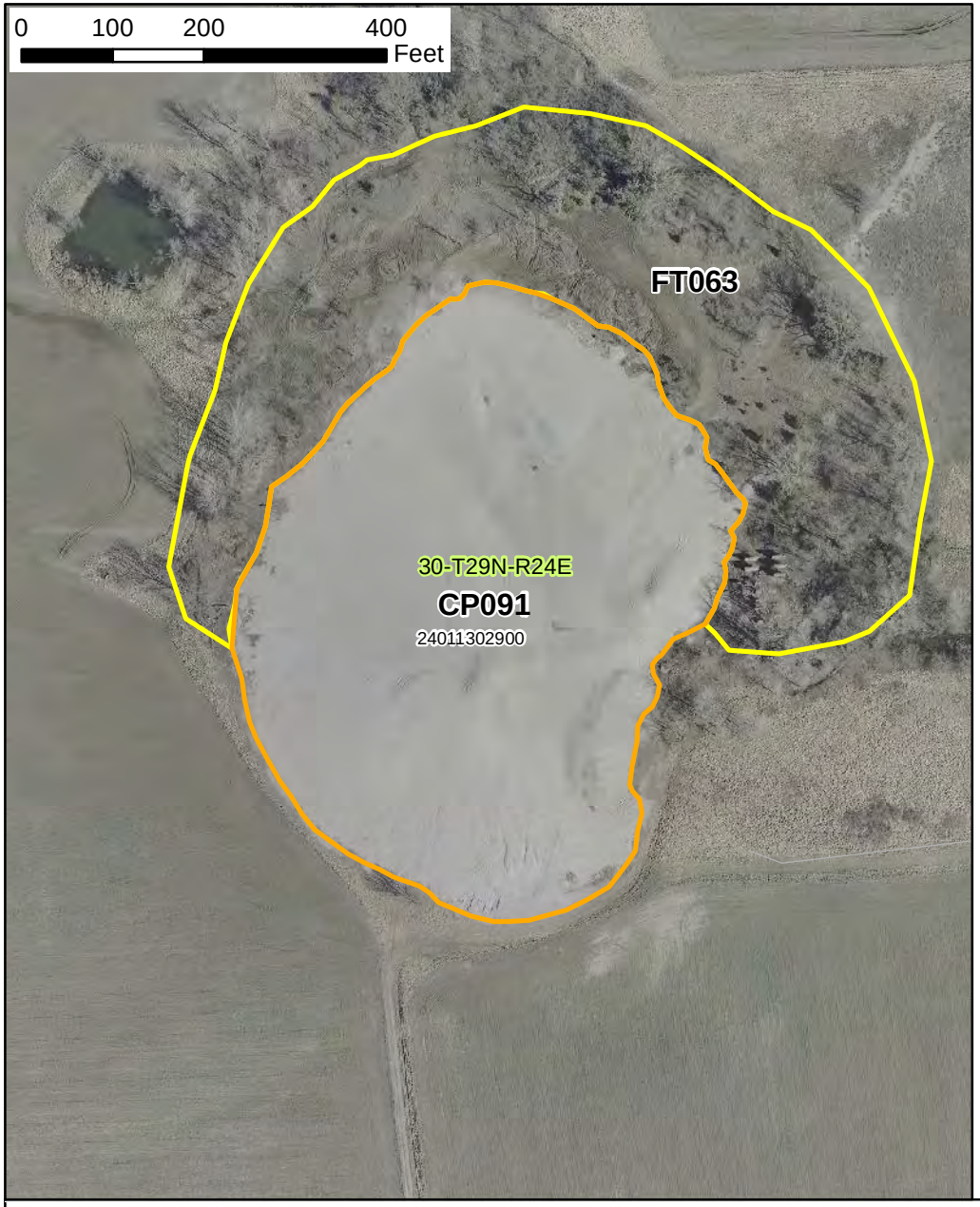
Specific Gravity Results

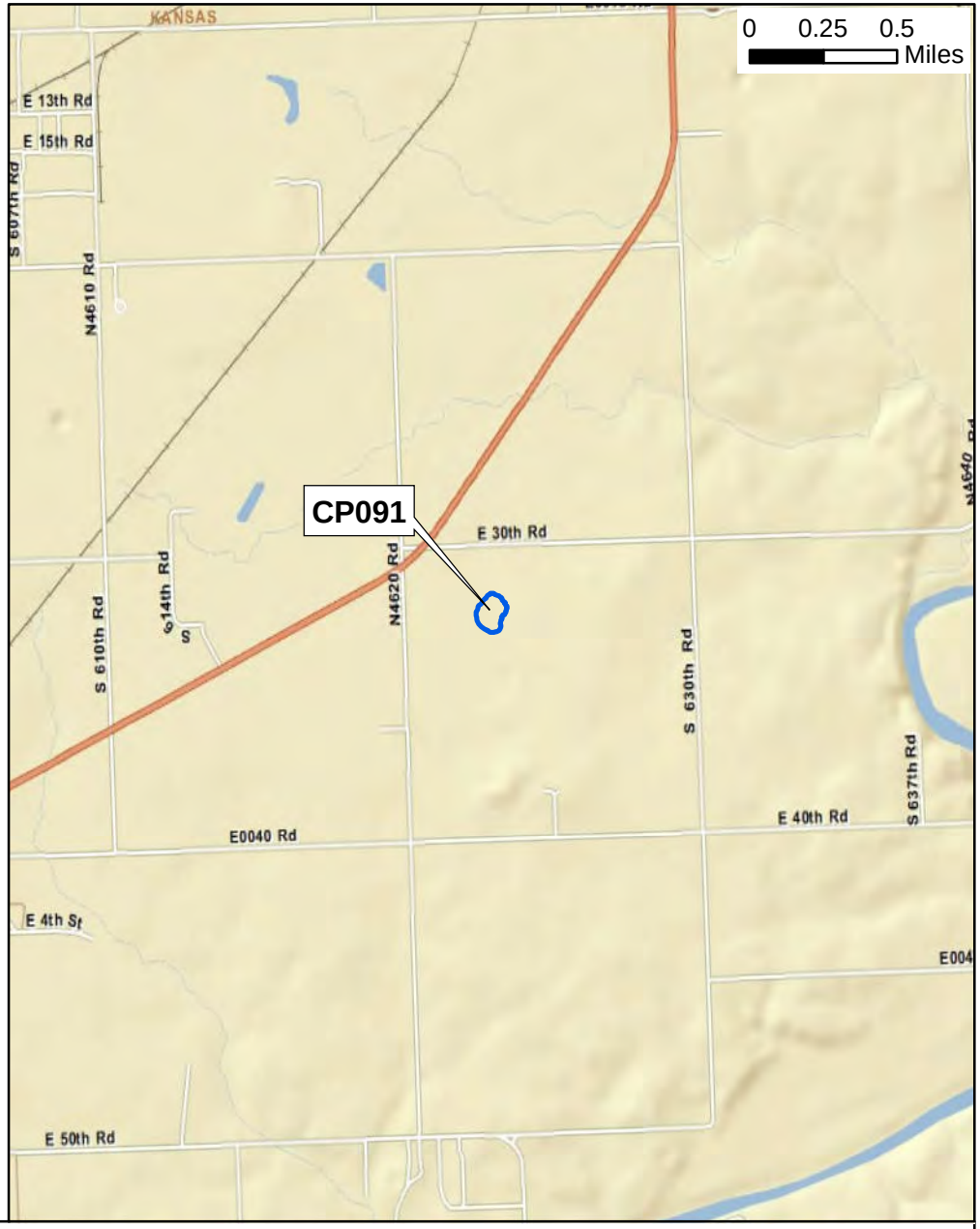
Sample ID	Date Sampled	Specific Gravity
CP091-01	3/5/2010	Fine Aggregate (apparent): 2.71
		Coarse Aggregate (apparent): 2.68
		Fine Aggregate (bulk): 2.48
		Coarse Aggregate (bulk): 2.50
Sample ID	**Date Sampled**	**Specific Gravity**
CP091-02	3/5/2010	Fine Aggregate (apparent): 2.69
		Coarse Aggregate (apparent): 2.74
		Fine Aggregate (bulk): 2.44
		Coarse Aggregate (bulk): 2.57
Sample ID	**Date Sampled**	**Specific Gravity**
CP091-03	3/5/2010	Fine Aggregate (apparent): 2.70
		Coarse Aggregate (apparent): 2.66
		Fine Aggregate (bulk): 2.46
		Coarse Aggregate (bulk): 2.49
Sample ID	**Date Sampled**	**Specific Gravity**
CP091-04	3/5/2010	Fine Aggregate (apparent): 2.67
		Coarse Aggregate (apparent): 2.65
		Fine Aggregate (bulk): 2.44
		Coarse Aggregate (bulk): 2.46

Lead Analysis Results

Sample ID	Date Sampled	Results	Units
CP091-01	3/5/2010	377	mg/kg
CP091-02	3/5/2010	105	mg/kg
CP091-03	3/5/2010	256	mg/kg
CP091-04	3/5/2010	469	mg/kg

Chat Pile/Base Location Map





Legend

- Creek
- Chat Piles
- Fine Tailings
- Chat Bases
- Property Boundary
- Sections
- Limited Access
- Highway
- Major Road
- Local Road

N

CP091
Pile/Base Location Map

Tar Creek Superfund Site
Operable Unit No. 4
Ottawa County, Oklahoma

CH2MHILL

J:\Tar_Creek\R6R2-043_TCSM_OU4_FR_395950\MapFiles\Materials_Processing_Mapbook_Piles.mxd zhirsch 7/26/2011 9:32:34 AM

Sieve Analysis Data

ANDERSON ENGINEERING, INC.

AGGREGATE- SIZE & SG REPORT

ASTM C136 & C127, C128

ENGINEERS - SURVEYORS - LABORATORIES - GEOTECHNICAL

811 E. THIRD ST, JOPLIN, MO 64801 417-782-7399

2045 W. WOODLAND, SPRINGFIELD, MO 65807 417-866-2741

JOB NAME :	*Tar Creek Super Fund Cleanup - 395950*			**CLIENT:** CH2M HILL	
JOB NO. :	*50013-10*	AE LAB NO.:	JS-036	**DATE :**	3/25/10
BORING / PIT NO. :	-	**DEPTH / ELEV. :**	-	**SAMPLE NO. :**	*CP091-01*
SAMPLE LOCATION :	-			**REVIEWED BY :**	CRW
SOIL DESCRIPTION :	*CHAT GRAVEL SAMPLE*			**SAMPLE TYPE :**	*Grab*
SG Fine Agg, G bulk :	*2.48*	**SG Fine Agg, G app.:**	*2.71*	**Fine Agg. Abs, %:**	3.5%
SG Coarse, G bulk :	*2.50*	**SG Coarse, G app.:**	*2.68*	**Coarse Abs, %:**	2.7%
FINES , % :	*7.0%*				
CLASSIFICATION	-	**UNIFIED :**	*SP-SM*	**AASHTO :**	-

Sieve No.	Percent Retained	Cumulative Percent Retained	Percent Finer
0.5"	0.0%	0.0%	100.0%
0.375"	0.0%	0.0%	100.0%
0.25"	10.5%	10.5%	89.5%
4	8.2%	18.7%	81.3%
8	21.2%	39.9%	60.1%
16	17.2%	57.1%	42.9%
30	14.3%	71.5%	28.5%
50	11.3%	82.8%	17.2%
100	6.5%	89.3%	10.7%
200	3.7%	93.0%	7.0%

ANDERSON ENGINEERING, INC.

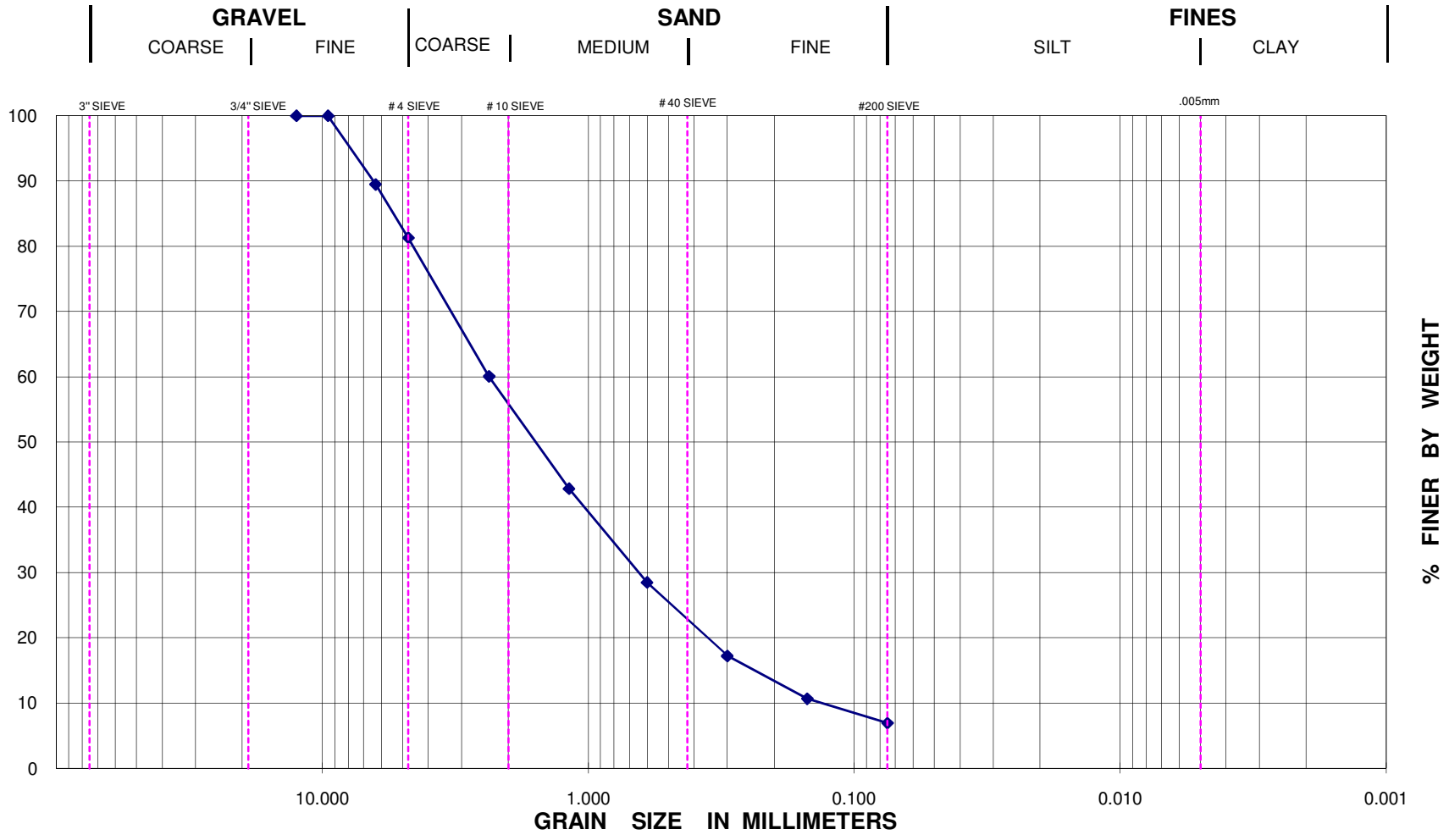
ENGINEERS - SURVEYORS - LABORATORIES - GEOTECHNICAL

811 E. THIRD ST, JOPLIN, MO 64801 417-782-7399, & 2045 W. WOODLAND, SPRINGFIELD, MO 65807 417-866-2741

AGGREGATE- SIZE & SG REPORT

ASTM C136 & C127, C128

JOB NAME :	*Tar Creek Super Fund Cleanup - 395950*			**CLIENT:** CH2M HILL		AE LAB NO.:	JS-036
JOB NO. :	*50013-10*	**REPORT NO. :**	-	**DATE :**	3/25/10	**REVIEWED BY :**	CRW
BORING / PIT NO. :	-	**DEPTH / ELEV. :**	-	**SAMPLE NO. :**	*CP091-01*	**SAMPLE TYPE :**	*Grab*
SAMPLE LOCATION : -							
SOIL DESCRIPTION : *CHAT GRAVEL SAMPLE*						**SP. GRAVITY, Gs :**	-
SG Fine Agg, G bulk :	*2.48*	**SG Fine Agg, G app.:**	*2.71*	**Fine Agg. Abs, %:**	3.5%	**FINES , % :**	*7.0%*
SG Coarse, G bulk :	*2.50*	**SG Coarse, G app.:**	*2.68*	**Coarse Abs, %:**	2.7%	**COEFF. OF CURVATURE , C_C :**	-
CLASSIFICATION	-	**UNIFIED :**	*SP-SM*	**AASHTO :**	-	**COEFF. OF UNIFORMITY , C_U :**	-



ANDERSON ENGINEERING, INC.

AGGREGATE- SIZE & SG REPORT

ASTM C136 & C127, C128

ENGINEERS - SURVEYORS - LABORATORIES - GEOTECHNICAL

811 E. THIRD ST, JOPLIN, MO 64801 417-782-7399

2045 W. WOODLAND, SPRINGFIELD, MO 65807 417-866-2741

JOB NAME :	*Tar Creek Super Fund Cleanup - 395950*			**CLIENT:** CH2M HILL	
JOB NO. :	*50013-10*	AE LAB NO.:	JS-037	**DATE :**	3/25/10
BORING / PIT NO. :	-	**DEPTH / ELEV. :**	-	**SAMPLE NO. :**	*CP091-02*
SAMPLE LOCATION :	-			**REVIEWED BY :**	CRW
SOIL DESCRIPTION :	*CHAT GRAVEL SAMPLE*			**SAMPLE TYPE :**	*Grab*
SG Fine Agg, G bulk :	*2.44*	**SG Fine Agg, G app.:**	*2.69*	**Fine Agg. Abs, %:**	3.9%
SG Coarse, G bulk :	*2.57*	**SG Coarse, G app.:**	*2.74*	**Coarse Abs, %:**	2.4%
FINES , % :	*8.5%*				
CLASSIFICATION	-	**UNIFIED :**	*SP-SM*	**AASHTO :**	-

Sieve No.	Percent Retained	Cumulative Percent Retained	Percent Finer
0.5"	0.0%	0.0%	100.0%
0.375"	0.3%	0.3%	99.7%
0.25"	13.4%	13.7%	86.3%
4	14.4%	28.1%	71.9%
8	22.8%	50.9%	49.1%
16	14.1%	65.0%	35.0%
30	10.3%	75.2%	24.8%
50	7.8%	83.1%	16.9%
100	5.0%	88.1%	11.9%
200	3.4%	91.5%	8.5%

ANDERSON ENGINEERING, INC.

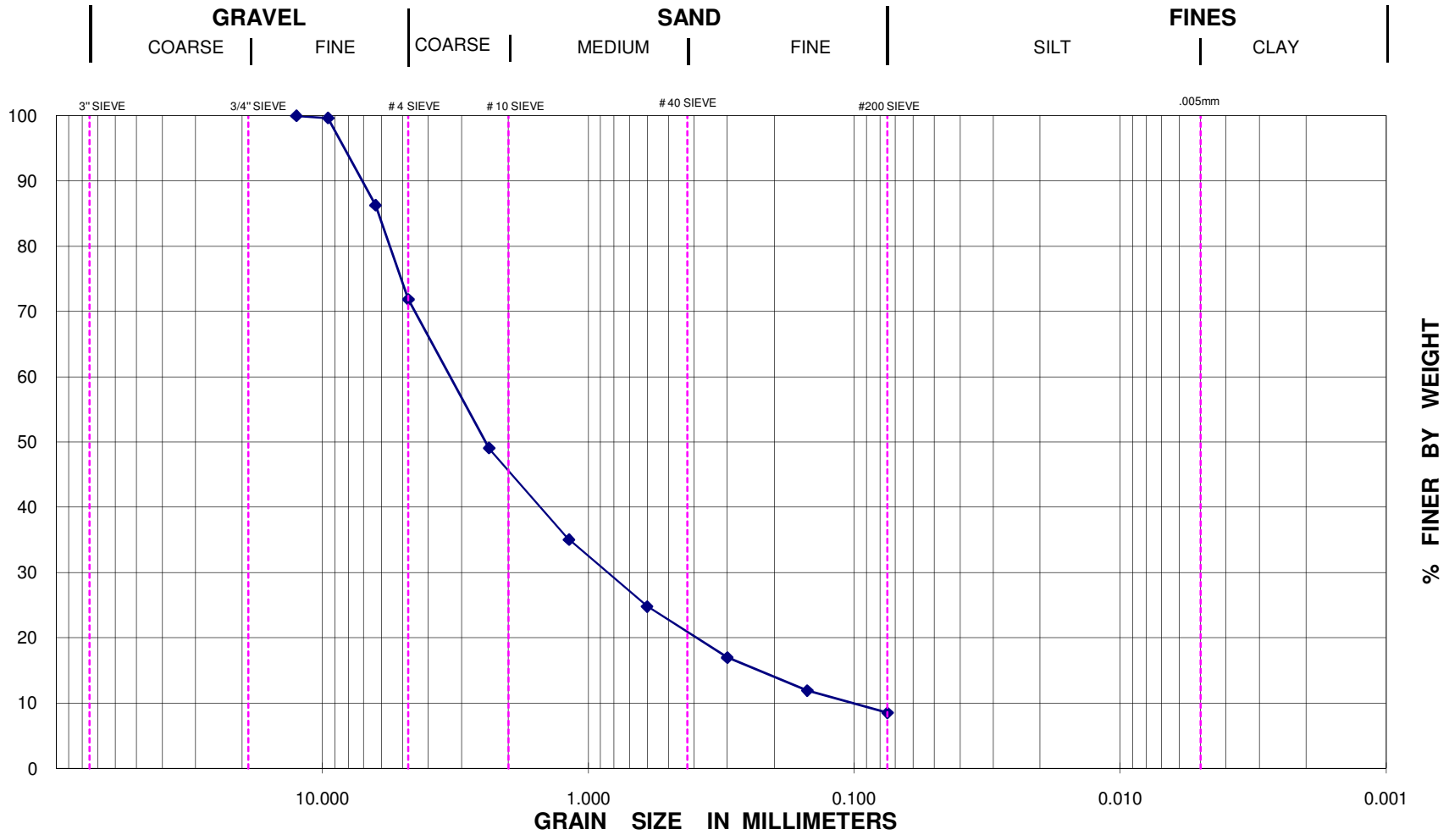
ENGINEERS - SURVEYORS - LABORATORIES - GEOTECHNICAL

811 E. THIRD ST, JOPLIN, MO 64801 417-782-7399, & 2045 W. WOODLAND, SPRINGFIELD, MO 65807 417-866-2741

AGGREGATE- SIZE & SG REPORT

ASTM C136 & C127, C128

JOB NAME :	*Tar Creek Super Fund Cleanup - 395950*			**CLIENT:** CH2M HILL		AE LAB NO.:	JS-037
JOB NO. :	*50013-10*	**REPORT NO. :**	-	**DATE :**	3/25/10	**REVIEWED BY :**	CRW
BORING / PIT NO. :	-	**DEPTH / ELEV. :**	-	**SAMPLE NO. :**	*CP091-02*	**SAMPLE TYPE :**	*Grab*
SAMPLE LOCATION : -							
SOIL DESCRIPTION : *CHAT GRAVEL SAMPLE*						**SP. GRAVITY, Gs :**	-
SG Fine Agg, G bulk :	*2.44*	**SG Fine Agg, G app.:**	*2.69*	**Fine Agg. Abs, %:**	3.9%	**FINES , % :**	*8.5%*
SG Coarse, G bulk :	*2.57*	**SG Coarse, G app.:**	*2.74*	**Coarse Abs, %:**	2.4%	**COEFF. OF CURVATURE , C_C :**	-
CLASSIFICATION	-	**UNIFIED :**	*SP-SM*	**AASHTO :**	-	**COEFF. OF UNIFORMITY , C_U :**	-



ANDERSON ENGINEERING, INC.

AGGREGATE- SIZE & SG REPORT

ASTM C136 & C127, C128

ENGINEERS - SURVEYORS - LABORATORIES - GEOTECHNICAL

811 E. THIRD ST, JOPLIN, MO 64801 417-782-7399

2045 W. WOODLAND, SPRINGFIELD, MO 65807 417-866-2741

JOB NAME :	*Tar Creek Super Fund Cleanup - 395950*			**CLIENT:** CH2M HILL	
JOB NO. :	*50013-10*	AE LAB NO.:	JS-038	**DATE :**	3/25/10
BORING / PIT NO. :	-	**DEPTH / ELEV. :**	-	**SAMPLE NO. :**	*CP091-03*
SAMPLE LOCATION :	-			**REVIEWED BY :**	CRW
SOIL DESCRIPTION :	*CHAT GRAVEL SAMPLE*			**SAMPLE TYPE :**	*Grab*
SG Fine Agg, G bulk :	*2.46*	**SG Fine Agg, G app.:**	*2.70*	**Fine Agg. Abs, %:**	3.6%
SG Coarse, G bulk :	*2.49*	**SG Coarse, G app.:**	*2.66*	**Coarse Abs, %:**	2.6%
FINES , % :	*10.0%*				
CLASSIFICATION	-	**UNIFIED :**	*SP-SM*	**AASHTO :**	-

Sieve No.	Percent Retained	Cumulative Percent Retained	Percent Finer
0.5"	0.0%	0.0%	100.0%
0.375"	1.4%	1.4%	98.6%
0.25"	11.5%	12.9%	87.1%
4	12.7%	25.6%	74.4%
8	23.7%	49.2%	50.8%
16	13.6%	62.8%	37.2%
30	10.3%	73.1%	26.9%
50	7.9%	81.1%	18.9%
100	5.5%	86.6%	13.4%
200	3.4%	90.0%	10.0%

ANDERSON ENGINEERING, INC.

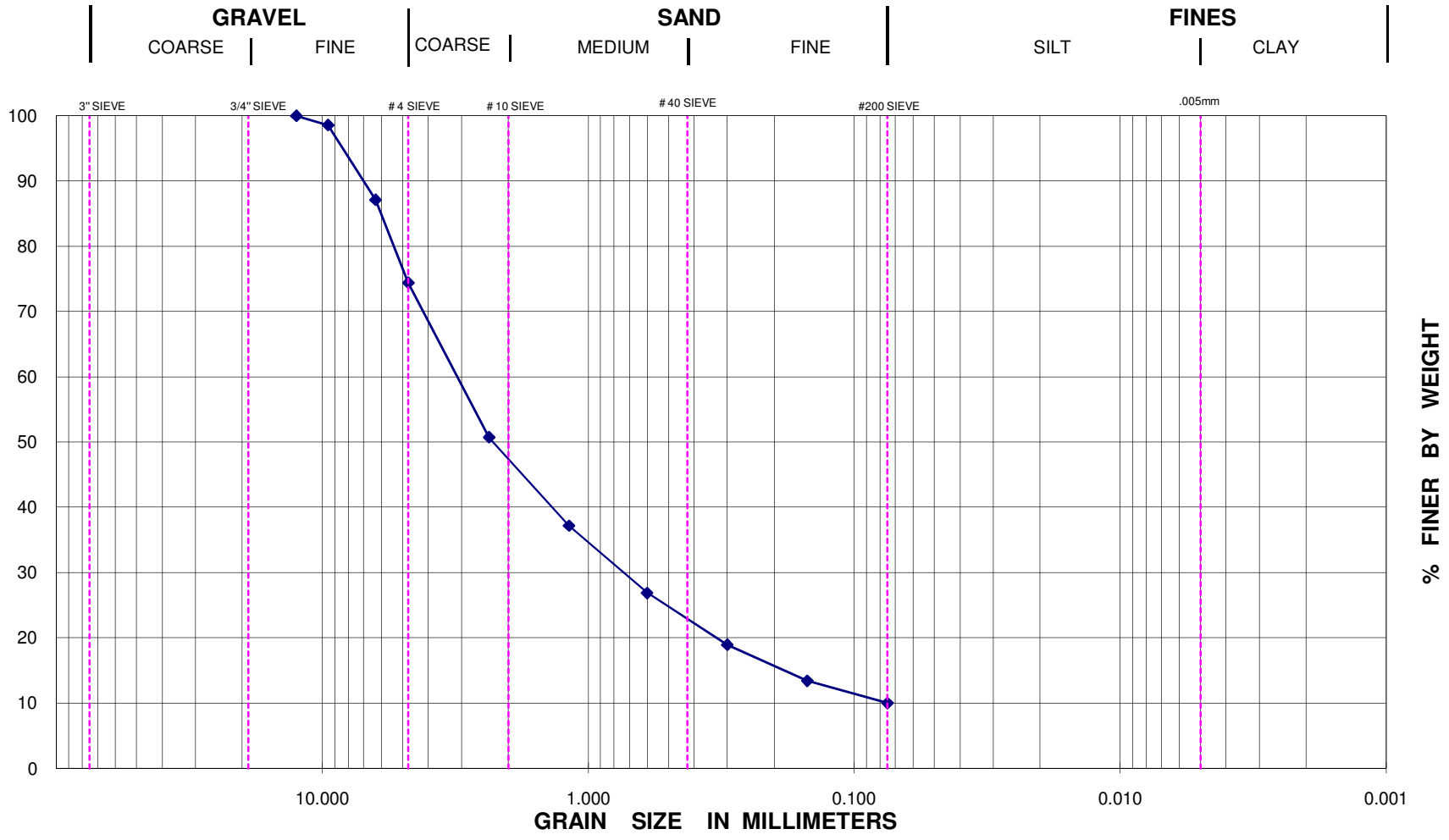
ENGINEERS - SURVEYORS - LABORATORIES - GEOTECHNICAL

811 E. THIRD ST, JOPLIN, MO 64801 417-782-7399, & 2045 W. WOODLAND, SPRINGFIELD, MO 65807 417-866-2741

AGGREGATE- SIZE & SG REPORT

ASTM C136 & C127, C128

JOB NAME :	*Tar Creek Super Fund Cleanup - 395950*			**CLIENT:** CH2M HILL		AE LAB NO.:	JS-038
JOB NO. :	*50013-10*	**REPORT NO. :**	-	**DATE :**	3/25/10	**REVIEWED BY :**	CRW
BORING / PIT NO. :	-	**DEPTH / ELEV. :**	-	**SAMPLE NO. :**	*CP091-03*	**SAMPLE TYPE :**	*Grab*
SAMPLE LOCATION : -							
SOIL DESCRIPTION : *CHAT GRAVEL SAMPLE*						**SP. GRAVITY, Gs :**	-
SG Fine Agg, G bulk :	*2.46*	**SG Fine Agg, G app.:**	*2.70*	**Fine Agg. Abs, %:**	3.6%	**FINES , % :**	*10.0%*
SG Coarse, G bulk :	*2.49*	**SG Coarse, G app.:**	*2.66*	**Coarse Abs, %:**	2.6%	**COEFF. OF CURVATURE , C_C :**	-
CLASSIFICATION	-	**UNIFIED :**	*SP-SM*	**AASHTO :**	-	**COEFF. OF UNIFORMITY , C_U :**	-



ANDERSON ENGINEERING, INC.

AGGREGATE- SIZE & SG REPORT

ASTM C136 & C127, C128

ENGINEERS - SURVEYORS - LABORATORIES - GEOTECHNICAL

811 E. THIRD ST, JOPLIN, MO 64801 417-782-7399

2045 W. WOODLAND, SPRINGFIELD, MO 65807 417-866-2741

JOB NAME :	*Tar Creek Super Fund Cleanup - 395950*			**CLIENT:** CH2M HILL	
JOB NO. :	*50013-10*	AE LAB NO.:	JS-039	**DATE :**	3/25/10
BORING / PIT NO. :	-	**DEPTH / ELEV. :**	-	**SAMPLE NO. :**	*CP091-04*
SAMPLE LOCATION :	-			**REVIEWED BY :**	CRW
SOIL DESCRIPTION :	*CHAT GRAVEL SAMPLE*			**SAMPLE TYPE :**	*Grab*
SG Fine Agg, G bulk :	*2.44*	**SG Fine Agg, G app.:**	*2.67*	**Fine Agg. Abs, %:**	3.6%
SG Coarse, G bulk :	*2.46*	**SG Coarse, G app.:**	*2.65*	**Coarse Abs, %:**	3.0%
FINES , % :	*7.7%*				
CLASSIFICATION	-	**UNIFIED :**	*SP-SM*	**AASHTO :**	-

Sieve No.	Percent Retained	Cumulative Percent Retained	Percent Finer
0.5"	0.0%	0.0%	100.0%
0.375"	0.0%	0.0%	100.0%
0.25"	14.0%	14.0%	86.0%
4	11.5%	25.5%	74.5%
8	26.1%	51.6%	48.4%
16	15.6%	67.2%	32.8%
30	10.4%	77.6%	22.4%
50	7.5%	85.1%	14.9%
100	4.3%	89.4%	10.6%
200	2.8%	92.3%	7.7%

ANDERSON ENGINEERING, INC.

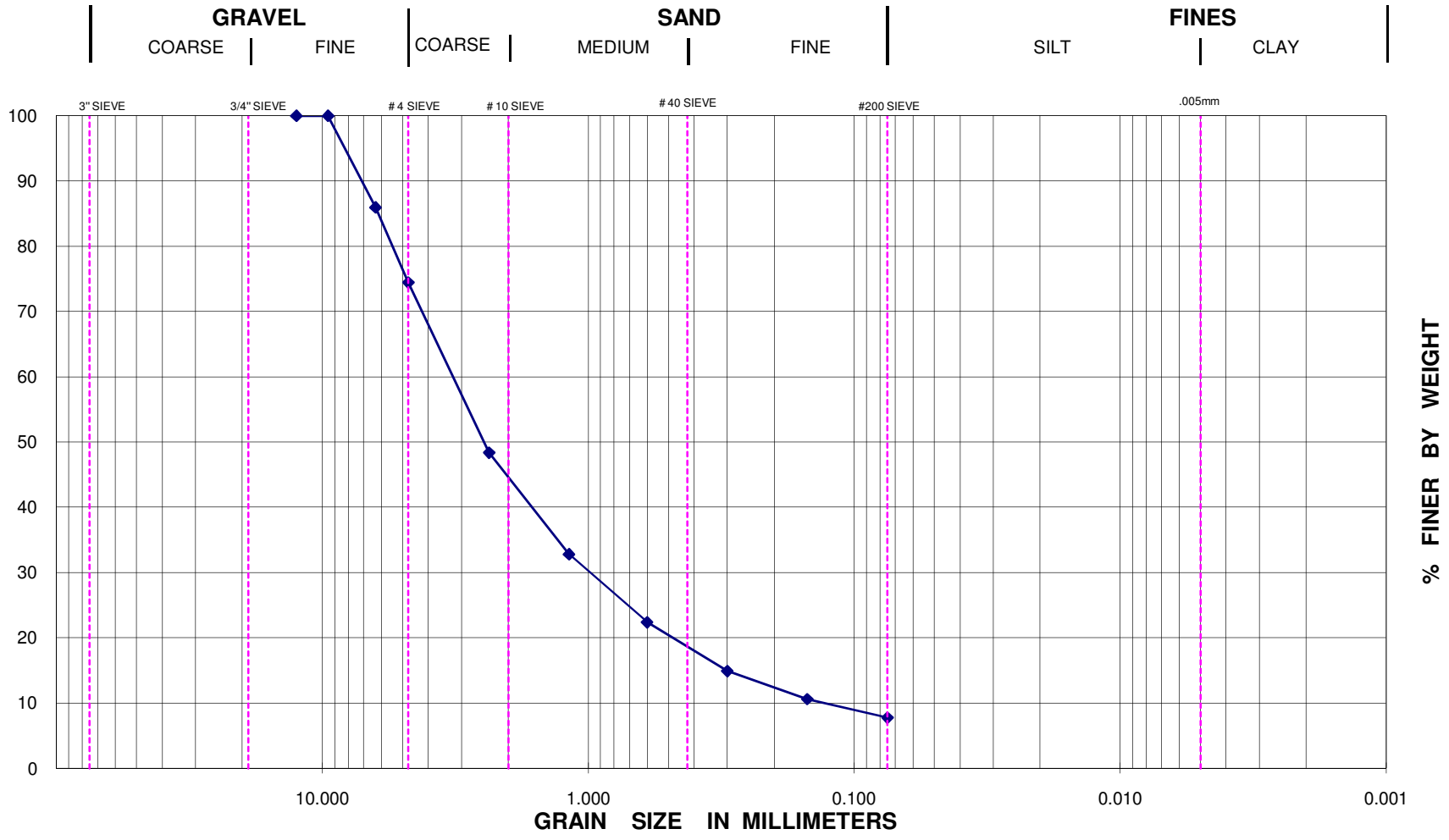
ENGINEERS - SURVEYORS - LABORATORIES - GEOTECHNICAL

811 E. THIRD ST, JOPLIN, MO 64801 417-782-7399, & 2045 W. WOODLAND, SPRINGFIELD, MO 65807 417-866-2741

AGGREGATE- SIZE & SG REPORT

ASTM C136 & C127, C128

JOB NAME :	*Tar Creek Super Fund Cleanup - 395950*			**CLIENT:** CH2M HILL		AE LAB NO.:	JS-039
JOB NO. :	*50013-10*	**REPORT NO. :**	-	**DATE :**	3/25/10	**REVIEWED BY :**	CRW
BORING / PIT NO. :	-	**DEPTH / ELEV. :**	-	**SAMPLE NO. :**	*CP091-04*	**SAMPLE TYPE :**	*Grab*
SAMPLE LOCATION : -							
SOIL DESCRIPTION : *CHAT GRAVEL SAMPLE*						**SP. GRAVITY, Gs :**	-
SG Fine Agg, G bulk :	*2.44*	**SG Fine Agg, G app.:**	*2.67*	**Fine Agg. Abs, %:**	3.6%	**FINES , % :**	*7.7%*
SG Coarse, G bulk :	*2.46*	**SG Coarse, G app.:**	*2.65*	**Coarse Abs, %:**	3.0%	**COEFF. OF CURVATURE , C_C :**	-
CLASSIFICATION	-	**UNIFIED :**	*SP-SM*	**AASHTO :**	-	**COEFF. OF UNIFORMITY , C_U :**	-



Lead Analysis Data

METHOD 3050B/6010B
LEAD BY TRACE ICP

Client	: CH2M HILL	Date Collected	: 03/05/10 12:00
Project	: TAR CREEK OU4	Date Received	: 03/06/10
SDG NO.	: 10C101	Date Extracted	: 03/09/10 09:45
Sample ID	: CP091-01	Date Analyzed	: 03/10/10 04:49
Lab Samp ID	: C101-27	Dilution Factor	: 1
Lab File ID	: ID8C010147	Matrix	: SOIL
Ext Btch ID	: IPC018S	% Moisture	: 7.3
Calib. Ref.	: ID8C010142	Instrument ID	: EMAXTID8

PARAMETERS	RESULTS (mg/kg)	RL (mg/kg)	MDL (mg/kg)
Lead	377	1.08	0.216

METHOD 3050B/6010B
LEAD BY TRACE ICP

Client	: CH2M HILL	Date Collected	: 03/05/10 12:30
Project	: TAR CREEK OU4	Date Received	: 03/06/10
SDG NO.	: 10C101	Date Extracted	: 03/09/10 09:45
Sample ID	: CP091-02	Date Analyzed	: 03/10/10 04:54
Lab Samp ID	: C101-28	Dilution Factor	: 1
Lab File ID	: ID8C010148	Matrix	: SOIL
Ext Btch ID	: IPC018S	% Moisture	: 7.2
Calib. Ref.	: ID8C010142	Instrument ID	: EMAXTID8

PARAMETERS	RESULTS (mg/kg)	RL (mg/kg)	MDL (mg/kg)
Lead	105	1.08	0.216

METHOD 3050B/6010B
LEAD BY TRACE ICP

Client	: CH2M HILL	Date Collected	: 03/05/10 12:44
Project	: TAR CREEK OU4	Date Received	: 03/06/10
SDG NO.	: 10C101	Date Extracted	: 03/09/10 09:45
Sample ID	: CP091-03	Date Analyzed	: 03/10/10 04:59
Lab Samp ID	: C101-29	Dilution Factor	: 1
Lab File ID	: ID8C010149	Matrix	: SOIL
Ext Btch ID	: IPC018S	% Moisture	: 7.6
Calib. Ref.	: ID8C010142	Instrument ID	: EMAXTID8

PARAMETERS	RESULTS (mg/kg)	RL (mg/kg)	MDL (mg/kg)
Lead	256	1.08	0.216

METHOD 3050B/6010B
LEAD BY TRACE ICP

Client	: CH2M HILL	Date Collected	: 03/05/10 13:00
Project	: TAR CREEK OU4	Date Received	: 03/06/10
SDG NO.	: 10C101	Date Extracted	: 03/09/10 09:45
Sample ID	: CP091-04	Date Analyzed	: 03/10/10 05:04
Lab Samp ID	: C101-30	Dilution Factor	: 1
Lab File ID	: ID8C010150	Matrix	: SOIL
Ext Btch ID	: IPC018S	% Moisture	: 8.1
Calib. Ref.	: ID8C010142	Instrument ID	: EMAXTID8

PARAMETERS	RESULTS (mg/kg)	RL (mg/kg)	MDL (mg/kg)
Lead	469	1.09	0.218